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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,969	04/04/2001	Robindra B. Joshi	39773/RJP/B600	4107

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EXAMINER

WANG, TED M

ART UNIT PAPER NUMBER

2634

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/826,969

Applicant(s)

JOSHI ET AL

Examiner

Ted M Wang

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5 and 6 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,7-16 and 27 is/are rejected.
- 7) ☒ Claim(s) 17-26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 August 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, filed August 31, 2004, with respect to the rejection(s) of claims 1, and 3-27 under 35 U.S.C. 103 and 112 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Belotserkovsky et al. (US 6,704,374).
2. The indicated allowability of claim 4 is withdrawn in view of the newly discovered reference(s) to US 6,704,374. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3, 4, 7-10, 13-16, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Belotserkovsky et al. (US 6,704,374).
 - With regard claim 1, Belotserkovsky et al. discloses a MCM transceiver comprising time domain down converting the received multi-carrier signal to base-band to provide a down-converted signal, the down-converted signal

including a plurality of data tones for transmitting data and training tones for carrier phase error correction (Fig.4 elements 12, 28, 30, 32, and 34); sampling a training tone of the down-converted signal to provide received data samples (Fig.4 elements 36, 38, and 40); providing a reference signal derived from the training tone of the down-converted signal (Fig.4 element 60 input, Fig.3 element 72 input); and estimating phase errors from a phase difference between the training tone and the reference signal derived from the training tone of the down-converted signal to provide a plurality of received sample phase error estimates for each data tone (Fig.3 elements 64 and 66).

- With regard claim 3, Belotserkovsky et al. discloses a MCM transceiver comprising time domain down-converting the received multi-carrier signal to base-band to provide a down-converted signal, the down-converted signal including a plurality of data tones for transmitting data and training tones for carrier phase error correction (Fig.4 elements 12, 28, 30, 32, and 34); time-domain down-converting each of the plurality of training tones to base-band to provide time-domain phase samples of each training tone (Fig.4 elements 28 and 30 outputs); providing a reference signal derived from the training tone of the down converted signal (Fig.4 element 60 input, Fig.3 element 72 input); estimating time domain phase errors from a phase difference between the time-domain phase samples of each training tone and the reference signal derived from the training tones of the down-converted signal to provide a plurality of time domain received sample phase error estimates for each time-domain

received data sample of the received multi-carrier signal (Fig.3 elements 60, 62, 64, and 66, and column 4 line 20 – column 6 line 17); coherently combining the time domain received sample phase error estimates of each of the plurality of training tones to provide a single coherently combined time-domain phase error estimate (Fig.3 element 64, and 66, and column 4 line 20 – column 6 line 17); applying the single coherently combined time-domain phase error estimate to the time-domain down-converted received multi-carrier signal to compensate for MCM signal frequency and phase errors (Fig.3 elements 60, 62, 64, 66, and column 4 line 20 – column 6 line 17); and frequency domain converting a compensated down-converted received multi-carrier signal for further digital signal processing (Fig.4 element 46 and column 3 line 17-32).

- With regard claim 4, Belotserkovsky et al. further discloses time-domain down-converting each of the plurality of data tones to base-band to provide time-domain phase samples of each training tone (Fig.4 elements 28 and 30 outputs); providing a reference signal derived from the training tone and data tones of the down converted signal (Fig.4 element 60 input, Fig.3 element 72 input); estimating time domain phase errors from a phase difference between the time-domain phase samples of each training tone and the reference signal derived from the training tones and data tone of the down-converted signal to provide a plurality of time domain received sample phase error estimates for each time-domain received data sample of the received multi-carrier signal (Fig.3 elements 60, 62, 64, and 66, and column 4 line 20 – column 6 line 17);

coherently combining the time domain received sample phase error estimates of each of the plurality of training tones and also of each the plurality of data tones to provide a single coherently combined time-domain phase error estimate (Fig.3 element 64, and 66, and column 4 line 20 – column 6 line 17). All other limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.

- With regard claim 7, which is a system claim related to claim 1, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 8, Belotserkovsky et al. further discloses the multi-carrier modulation receiver is disposed as a digital circuit using digital signal processing techniques (Fig.4 elements 46 and 60).
- With regard claim 9, Belotserkovsky et al. further discloses a training tone tracking circuit input (Fig.3 elements 68 and 72 input);
a training tone tracking circuit output (Fig.3 element 66 output);
a training tone tracking PLL having and PLL input coupled to a-the training tone tracking circuit input and a PLL output (Fig.3 elements 64, 72, 74, and 80); and
a multiplier having a first input coupled to the PLL output of the training tone tracking a second input coupled to the training tone tracking circuit input, and an output coupled to the training tone tracking circuit output (Fig.3 element 66).
- With regard claim 10, Belotserkovsky et al. further discloses the training tone tracking PLL includes that:

a phase detector having an input coupled to the training tone tracking PLL input (Fig.3 elements 64 and 74);

a loop filter having an input coupled to an output of the phase detector (Fig.3 elements 64 and 76); and

a frequency synthesizer having an input coupled an output of the loop filter, and a frequency synthesizer output coupled a training tone tracking PLL output and to a reference frequency input of the phase detector (Fig.3 elements 64 and 80).

- With regard claim 13, Belotserkovsky et al. further discloses that a matching delay circuit wherein the matching delay circuit input is coupled to the training tone tracking circuit input (Fig.3 elements 68, 70, and 72). All other limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 14, all limitation is contained in claims 10 and 13. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 15, all limitation is contained in claims 11 and 13. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 16, all limitation is contained in claims 12 and 14. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 27, all limitation is contained in claims 8 and 9. The explanation of all the limitation is already addressed in the above paragraph.

Claim Rejections - 35 USC § 103

Art Unit: 2634

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belotserkovsky et al. (US 6,704,374) in view of Baumert (US 5,406,592).

- With regard claims 11, Belotserkovsky et al. discloses all limitation except specifically teaching that PLL includes a second order phase locked loop.

However, Baumert teaches a phase locked loop including a second order phase locked loop with a first order loop filter (column 1 lines 12-58).

It is desirable to include a second order phase locked loop in the tracking circuit in order to improve the high frequency jitter and phase error (column 1 lines 32-58). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the system as taught by Doblar in which, include a second order phase locked loop circuit, into Belotserkovsky's PLL so as to improve the high frequency jitter and phase error.

- With regard claims 12, all limitation is all limitation is contained in claims 10 and 11. The explanation of all the limitation is already addressed in the above paragraph.

Allowable Subject Matter

7. Claims 5 and 6 are allowed.
8. Claims 17-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (571) 272-3053. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang
Examiner
Art Unit 2634

Ted M. Wang



SHUWANG LIU
PRIMARY EXAMINER